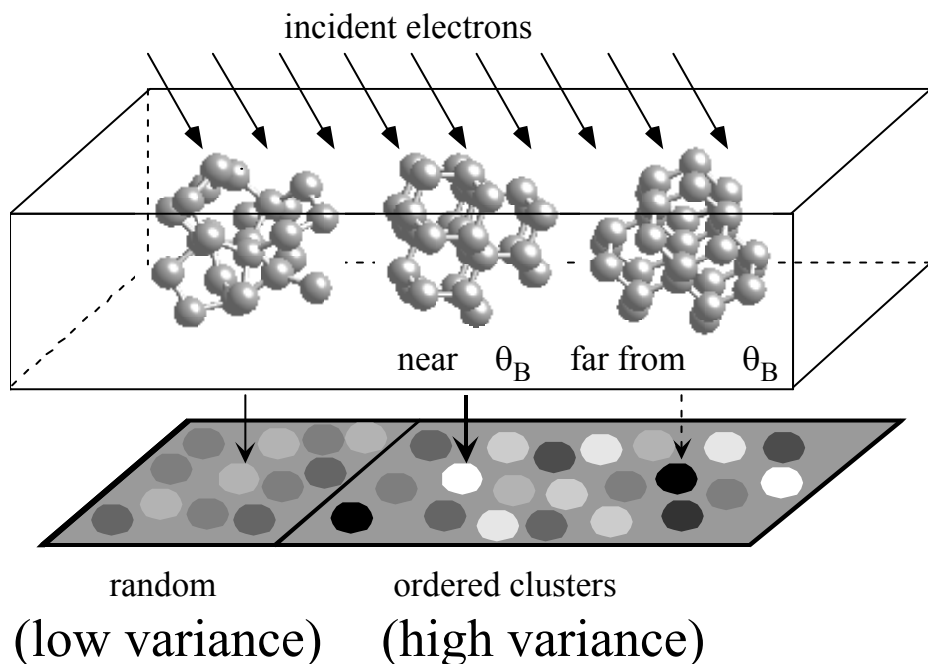


Nanoscale Order in Amorphous Solids: Structure, Transformations and Electronic Properties

J. R. Abelson, D. A. Drabold, J. M. Gibson,
P. M. Goldbart, and P. M. Voyles

University of Illinois at Urbana-Champaign, DMR 02-05858

Fluctuation Electron Microscopy in the TEM reveals the presence of nanometer-sized ordered regions in amorphous solids via statistical analysis of the image variance V vs. scattering vector k at mesoscopic resolution.

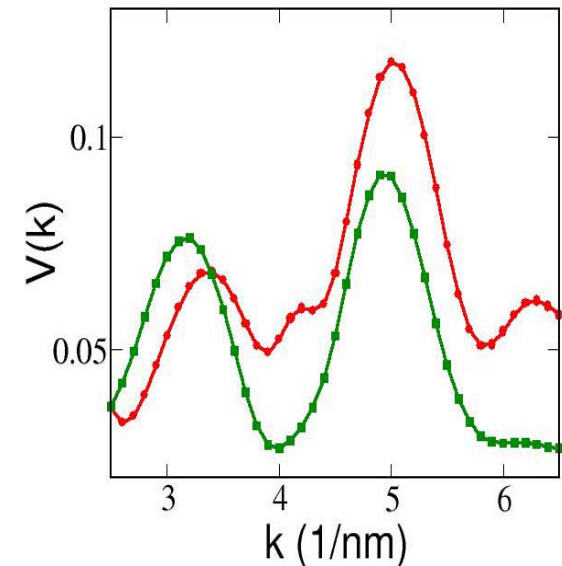
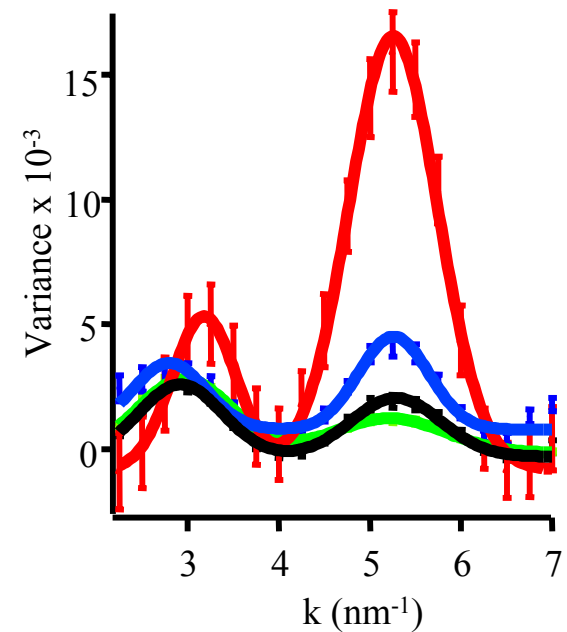


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Fluctuation Electron Microscopy data (top) reveal that amorphous silicon is not a covalent random network – it contains over 20 volume % of nanocrystalline domains. Simulations (bottom) show that the peak at 5 nm^{-1} dominates only when the domains have a degree of preferred orientation, analogous to that observed during growth of polycrystalline Si films.



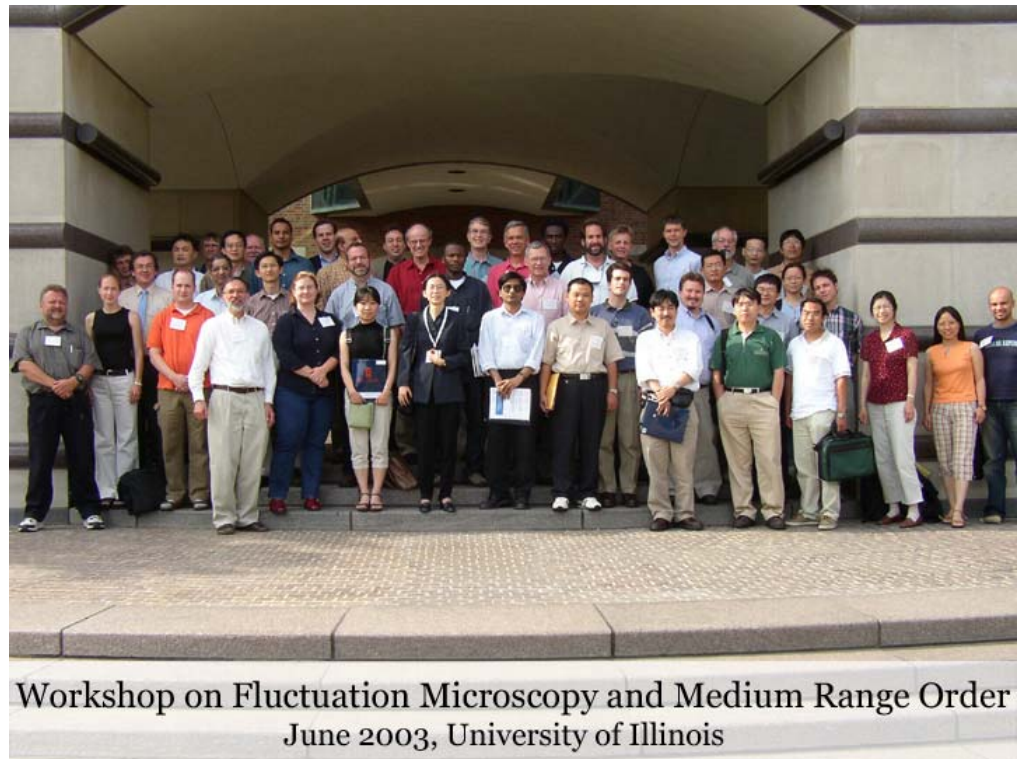
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Education and Outreach:

We sponsored a workshop on fluctuation microscopy and medium range order that was attended by specialists in amorphous glass, metal, and semiconductor materials, as well as experts in TEM and network topology. The 55 participants represented 18 scientific institutions from the U.S., Australia, Britain, Canada and Korea.



Workshop on Fluctuation Microscopy and Medium Range Order
June 2003, University of Illinois